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GEOGRAPHIC VARIATION AND PLUMAGES IN AUSTRALIAN BOWERBIRDS (PTILONORHYNCHIDAE)

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INTRODUCTION

In view of the great recent interest in the biology of bowerbirds, it is surprising how little is known about the taxonomy of the Australian species. The available accounts in the standard works are very confusing, since no difference is made in most of them between synonyms and valid subspecies. Furthermore, a study of individual variation, of the sequence of plumages, and of measurements is badly needed, as information on these matters is woefully inadequate in the existing literature. In fact, we know much more about the New Guinea species than about the most familiar Australian birds.

The following account is based on the material in the American Museum of Natural History which includes the Rothschild and Mathews collections. Where this material proved inadequate, additional specimens were borrowed from the United States National Museum, the Chicago Natural History Museum, the Museum of Comparative Zoölogy, and the Academy of Natural Sciences of Philadelphia (including parts of the Gould Collection). We greatly appreciate the kindness of the curators of these institutions in making this material available.

Ailuroedus crassirostris Paykull

GREEN CATBIRD

The only two Australian subspecies of this Australo-Papuan species are so different from each other that they were listed as

two species in most of the older literature. However, their essential similarity, the agreement of habits, and the basic difference from *buccoides* (New Guinea), the only other species of the genus, make it evident that *crassirostris* Paykull, 1815 (= *viridis* Vieillot, 1817), and *maculosus* Ramsay, 1875, must be considered as conspecific. Their ranges are separated by a wide gap in central Queensland.

Ailuroedus crassirostris crassirostris

The nominate race has a rather wide range from southern New South Wales (Shoalhaven River, Kangaroo Valley, Myall Lakes) to southern Queensland (Bunya Mountains, Blackall Range).

Within this range there is a certain amount of slight geographical variation, failing, however, by far to reach the level of subspecific distinctness. Birds from the southernmost portion of the range appear to average smaller than birds from the Richmond River district and from south Queensland. Wing, adult males: Queensland, 162, 164, 165; northern New South Wales, 159, 159.5, 165, 166, 167; southern New South Wales, 156, 161; adult females: Queensland, 158, 162.5, 165.5; northern New South Wales, 157.5, 163, 164, 165, 166, 167, 168.5, 170; southern New South Wales, 155, 161, 161. Birds from the Richmond River region have the throat rather darker and the white spotting of the under parts reduced. However, birds from southern Queensland (lighter throat, more white spotting) are indistinguishable from birds from central and southern New South Wales (Gosford, Ourimbali, Shoalhaven River). Since this variation is so irregular (and very slight in any case), it would serve no useful purpose to subdivide *crassirostris*. Mathews' *blaauwi* (1912, *Novitates Zool.*, vol. 18, p. 439, Richmond River), which was based on the mentioned slight differences of the northern New South Wales population, is not worthy of recognition and was synonymized by the author himself in his later publications.

Immatures differ in various characters. The outer web of the first primary is broader, the tail feathers are more pointed and with less white at the tip of the outer web, the size is smaller, the crown is more blue-green (in adults more golden green), the throat is more whitish, and the light spots on the under parts are broader, more oval rather than lanceolate. Wing, males, 149,

158, 160; females, 152, 152, 153, 156. There is no difference of coloration between males and females, only an average difference of size.

Ailuroedus crassirostris maculosus

There is no geographical variation within the very restricted range of this subspecies. Mathews' *fairfaxi* (1915, Austral Avian Rec., vol. 2, p. 132, Bellenden Ker), supposedly differing from *maculosus* "in its general lighter coloration, especially noticeable in the under-surface" is purely imaginary. There are no differences of coloration between males and females, but females average smaller. Wing, adult male, 147–159; female, 141–152. Tail, male, 98.5–109; female, 95–101. Immatures have a more pointed tail, a browner and softer wing, and are lighter underneath. Wing, immature males, 135.5, 136, 142, 145, 146; immature females, 136, 147.

Mathews described (1941, Emu, vol. 40, p. 384) a new subspecies from "Cape York" with the exhaustive description "smaller. Wing 133, bill 26, tarsus 42, tail 92." To judge from the measurements he saw only a single specimen. The bird presumably came from the Coen area, the only part of Cape York, to my knowledge, visited by the collector (Dr. G. Scott). Better evidence is needed before this form can be accepted.

The range of *maculosus* is characterized by the following localities in the Rothschild and Mathews collections: Johnstone River, Barron River, Kuranda, Bellenden Ker, Atherton, Cairns, Tolga, Mt. Sapphire, Cardwell, and Cedar Bay.

Among the 81 Australian specimens of these two subspecies examined by us, there are only 11 to 13 immatures (two uncertain). This is a very small percentage (about 15 per cent) compared with 28.5 per cent in the Satin Bowerbird. It is unknown whether this small number of young in collections is due to the retiring nature of young catbirds or the shortness of the period during which they wear their immature plumage. This point requires further study.

The types of *fairfaxi* Mathews and *blaauwi* Mathews were examined.

***Scenopoeetes dentirostris* Ramsay**

TOOTH-BILLED BOWERBIRD

The geographic range of this species in the Cairns district is so restricted that one could not possibly expect any geographical

variation. Nevertheless Mathews (1915, Austral Avian Rec., vol. 2, p. 132) described a subspecies *minor* from the Johnstone River as differing "by smaller size." The type, an immature male, has a wing of 140 mm. and is thus smaller than adult birds from the Johnstone River, which are indistinguishable in size and coloration from adults collected in the Atherton and Herberton highlands.

Males and females are identical in coloration, but females average smaller. Immatures can be recognized not only by smaller size but also by the different shape of wing and tail feathers and by ochraceous edges to the upper wing coverts.

Wing, 13 males, 148–152 (149.8); seven females, 144–150.5 (147.0); immature females, 137.5, immature males, 140, 146.

Specimens were examined from Allumbah, Atherton, Barron River, Evelyn Scrub (Herberton), Johnstone River, Kuranda, Russell River, and Tolga.

***Prionodura newtoniana* De Vis**

GOLDEN BOWERBIRD

Although there is no geographical variation within the very limited range of this species, there is a great deal of individual variation with respect to the shade of yellow in adult males, which ranges from a pale cadmium yellow (almost lemon-yellow) to a deep orange-yellow. Variation of size, on the other hand, is extraordinarily slight. The names *mestoni* De Vis and *fairfaxi* Mathews (type examined) are synonyms.

The sequence of plumages is not yet understood, owing to insufficient well-sexed material. Specimens in the Rothschild Collection labeled "adult female" are indistinguishable from others labeled "immature male." Since some of the latter molt from a worn brown wing to another brown wing, it appears probable that they are missexed. About 75 per cent of the specimens in the collection are in the adult male plumage. This disproportion reflects, no doubt, the relative conspicuousness of the plumages rather than their frequency in nature.

Size appears very constant in this species. In a series of 48 adult males, with a mean wing size of 122.6 mm., no fewer than 42 birds had a wing from 120 to 124 mm. The coefficient of variability of the entire series, 1.54, is very low. Wing, males, 120–129; females, 115–124. Tail, males, 104–116; females, 83–

86. Adult males have a much longer tail than females and immature males.

Specimens are available from Evelyn Scrub, Herberton Range, Bellenden Ker, Mt. Bartle Frere, upper Tully River, Russell River, and Mt. Coleman.

***Ptilonorhynchus violaceus* Vieillot**

SATIN BOWERBIRD

This species has only two subspecies in its wide range.

The nominate subspecies extends from southern Queensland to Victoria. There is no trace of geographic variation in this wide area. Birds from Queensland and Victoria appear to be identical in size and coloration in every plumage. Mathews gave his customary synonym to this species by describing *dulciae* (1912, *Novitates Zool.*, vol. 18, p. 438) from south Queensland, "Differs from *P. v. violaceus* in its shorter wing—166 mm., typical birds 170–173 mm." This is altogether misleading. Adult males from southern Queensland vary from 164.5 to 176 mm., and those from New South Wales from 163 to 174 (169.9). Furthermore, the type of *dulciae* has a wing of 172 mm., as already marked on the label by Hartert.

PLUMAGES: The plumages of this species have never been adequately described. Immatures are recognizable by the more pointed tail feathers and the more brownish wings. The upper wing coverts have ocher or rufous edges. The bird depicted as female in Mathews' "The birds of Australia" (vol. 12, pl. 581) is such an immature.

The female molts into her final plumage from this immature plumage; the male, however, molts first into a subadult plumage. The differences between this plumage and the very similar plumage of the adult female seem never to have been pointed out in the literature. Such subadult males differ from adult females in having smaller light spots on throat and breast and a definite grayish green collar across the lower throat. They average larger than females. Wing, subadult males, 167, 168, 168, 169, 169, 170.5, 171, 172, 172, 172; adult females, 160, 166, 166, 167, 167.

The ends of the geographical range of the nominate race are characterized by the following localities in the Rothschild Collection: Victoria: Selby, Lang-lang, Olinda, Cape Otway, Noura, Dandenong Mountains, Gippsland. Queensland: War-

wick, Bunya Mountains. So far as we know, there is no good map in the literature with the exact distribution of this species.

Completely isolated in the Cairns district of northern Queensland is the much smaller subspecies *minor* Campbell. Wing, adult males, 153, 157, 158; adult females, 147.5, 148. Tail, males, 94.5, 95, 96; females, 98, 100.

The males are indistinguishable in coloration from nominate *violaceus*. However, two specimens, sexed as females, differ from females of *violaceus* in having the breast washed with gray-green, the size of the light spots of the under parts reduced, and the dark bars on the feathers of breast and flanks broadened. The short wing indicates that these specimens are correctly sexed, although in their coloration they resemble more the subadult males of *violaceus* than the females. They differ from subadult males of *violaceus* in the darker, more olive, less rufous wing, and in lacking the dark borders around the white spots on the feathers of the throat. The ground color of the ear coverts is olive-gray, lacking the rufous or ocher wash of *violaceus*.

Sericulus chrysocephalus Lewin

REGENT BIRD

This species has a continuous range from New South Wales to southern Queensland, although in the northernmost part it seems to be restricted to mountains. Three adult males from the Bunya Mountains and the Blackall Range in southern Queensland are rather more richly orange colored on crown and nape than birds from southern and northern New South Wales. It is thus perhaps justifiable to recognize *rothschildi* Mathews (type examined), which was described from the Blackall Range. Three immatures and females from the Bunya Mountains are much blacker on the back than birds from New South Wales, but this may be due to the fact that they are recently collected and have not yet foxed.

PLUMAGES: Lacking well-sexed specimens, particularly adult females, it is difficult to describe the sequence of plumages. Apparently there is very little difference between the juvenal, the subadult male, and the adult female. Juvenals seem to have the tail feathers more pointed and to have less black on back and crown. The black stripe in the middle of the throat is less developed in juvenals.

There is great individual variability in these plumages, and

some of the subadult male plumages are "progressive," that is, they contain feathers that are partly yellow and partly black.

MEASUREMENTS: Wing: Southern New South Wales, adult males, 127–129 (128.1); adult females, 135, 136; immature males and females, 131–141 (135.4). Northern New South Wales, adult males, 126.5–135 (130.0); adult females, 133, 137.5; immatures, 133.5–140 (135.1). Queensland, adult males, 125, 128, 126.5, 130; immatures, 131, 134, 136.

Tail: Southern New South Wales, adult males, 82–87 (84.6); adult females, 100, 105; immatures, 94–104.5 (100.5). Northern New South Wales, adult males, 81–92 (84.7); adult females, 100–105; immatures, 93–103. Queensland, adult males, 81–8 (83.3); immatures, 96.5, 100, 103.5.

An extraordinary fact is evident from these measurements. Adult females and immature birds (of both sexes) have approximately the same measurements of wing and tail. Adult males, however, have both wing and tail much shorter than immatures. Unfortunately, no weights are available, but there is no reason to believe that there is a reduction in general size. For the tail it has been known (for instance, in hawks) that it may be shorter in adults than in immatures, but for the wing it seems not to have been recorded previously. The alteration in the shape of the wing is presumably correlated with the courtship performance of the adult male.

A study of *Sericulus* Swainson, 1825, raises the question as to the validity of the New Guinea genus *Xanthomelus* Bonaparte, 1854. As Chapin (1929, Amer. Mus. Novitates, no. 367, p. 3) has pointed out, "*Xanthomelus*" *bakeri* Chapin is an almost perfect link between "*Sericulus*" *chrysocephalus* and "*Xanthomelus*" *aureus* and casts therefore serious doubt on the validity of *Xanthomelus*. The apparent differences between the two so-called genera do not seem to exceed the level of specific distinctness. The bill is narrower and more slender in *chrysocephalus*, the tail is more deeply forked (in adult males), and the outer primaries are narrower. The yellow patch on the upper back of *chrysocephalus* is not modified into a cape as it is in "*Xanthomelus*." The similarities between *chrysocephalus* and *aureus-bakeri*, however, seem more important. Both have a forked tail, and the extensive yellow patch at the base of the wing is nearly the same in both species groups. In its color pattern *bakeri* is closer to *chrysocephalus* than to *aureus*. This is due to the black

under parts, sides of head and mantle in the adult male, the brown color and the barring of the under parts of the immature male, and the whitish centers of the feathers of the mantle of the immature male. The Australian and the Papuan species of this group appear less different from each other than are the various species of *Chlamydera*. In view of these considerations, there would seem to be no justification in continuing the generic recognition of *Xanthomelus*.

THE GENUS *CHLAMYDERA*

Forest is the typical habitat of bowerbirds. Only a few genera contain species that were able to adapt themselves to more open country. The genus *Chlamydera* is most advanced in this respect, since all of its four species live in more or less open country. There is an interesting difference between the species in the amount of ornamentation: in *maculata* both male and female have the handsome nuchal crest, in *nuchalis* usually only the male has it, and finally in *cerviniventris* and *lauterbachii* it occurs in neither sex. In view of the general distribution of bright colors in the more primitive species of the family, there is every reason to suspect that we have here a secondary loss of ornamentation in these savanna birds and that *C. cerviniventris* and *lauterbachii* do not represent the primitive condition.

Chlamydera maculata Gould

SPOTTED BOWERBIRD

There is a conspicuous difference between the eastern (*maculata*) and western (*guttata*) populations of this species. Indeed the difference is so great that it might be suspected that the level of specific difference has been reached. The differences can be tabulated as follows:

	<i>maculata</i>	<i>guttata</i>
Throat	Buffy ocher, with inconspicuous black streaking	Black, with ocher or rusty oval spots
Upper parts	Blackish brown, with ocher spots	Black, with rufous spots
Flanks	Buffy, like abdomen	Rust colored
Nape	An unspotted, fuscous gray area usually present	Colored like the back
Bill	Heavy, blunt	More slender and more pointed
Tail	Long, 71-81 per cent of wing	Short, 59-68 per cent of wing

There is no intergradation between *maculata* and *guttata*, and the ranges appear to be separated by a wide gap.

Within the range of *maculata* the following populations have been distinguished. As our material is not sufficient for a final decision, we place all described forms in quotation marks.

"clelandi"

This name is represented by the unique type (examined), said to have come from "South Australia" (Cleland Collection). It is a badly soiled specimen, which accounts for the "redder abdomen" mentioned in the description. The bill is badly discolored; in fact, the horny sheath of the maxilla seems to be lacking, which would explain the paler color and small size. The nuchal crest is pale but not conspicuously different from that of some of the New South Wales specimens. Every one of the diagnostic characters mentioned by Mathews is thus invalidated. The only reason we mention this specimen is that it has the spotting of back and upper tail coverts deeper tawny chestnut than any specimen in a large series from New South Wales. Two Victoria birds agree with the New South Wales series. Additional specimens from the Murray River section should be examined to check the possible validity of this color character. Condon (1951, South Australian Ornith., vol. 20, p. 64) has already discussed the non-validity of the bill character.

maculata

Typical specimens of the nominate race were examined from the Lachlan River, Cobar, Macquarie River, and Buckingham (Nyngan).

"occipitalis" GOULD

This form was described by Gould from "Port Albany, N. Queensland," a locality that we have been unable to trace, but that is apparently near Rockhampton. The characters mentioned by Gould ("longer crest," etc.) are not valid. Nevertheless, the population of the Rockhampton district appears slightly different from New South Wales birds. Throat and sides of head average less rusty; the spots on the upper parts are darker (more chestnut) and smaller; the ground color of the back is blacker. The difference, however, is only an average difference, and individual birds from both areas can be matched with one

another. It does not seem justifiable to recognize the mid-Queensland population subspecifically. Nine specimens were examined from the vicinity of Rockhampton, from Coomoooolaroo, Dawson River, and from Blackwater, 160 miles west of Rockhampton (Chicago Natural History Museum). An immature from Pentland has small spots on the back (fig. 1C).

“*sedani*” MATHEWS

This form was described as follows: “Differs from *C. m. maculata* in being much lighter, and with the frill on the neck of quite a pinkish colour.” There is no difference between *sedani* and *maculata* in the color of the nuchal crest, and the paleness of the only two specimens that Mathews had of this form is due to the fact that they are badly worn and bleached. A few newly molted feathers are not lighter than light specimens of *maculata*. Four adults cannot be separated from *maculata*, except that the spots on the upper parts tend to average larger. A single juvenile (A.M.N.H. No. 679143) is quite different from immatures of *maculata* in the collection. It has the spots on the upper parts lighter, larger, and more oval, less triangular. (See fig. 1 B.)

Measurements are similar in all populations. Wing, adult males, 146–155; females, 144–149. Tail-wing index, 71.2–80.5.

Immatures of all populations are characterized by the heavier barring of throat, breast, and flanks, the absence of a nuchal crest, the broader light tips to the primaries, and the more pointed tail.

guttata GROUP

The available material is altogether insufficient for determination of geographical variation. Of the seven specimens in the Mathews Collection (including two immatures), three are types!

In a comparison of males with males, females with females, and immatures with immatures, and with allowance for the effects of wear and bleaching, there is no indication of geographical variation. Specimens from mid-west Australia (Northwest Cape, Onslow), East Murchison, and Macdonnell Ranges appear indistinguishable. We consider *nova*, *subguttata*, and *macdonaldi* as synonyms. However, a study of more extensive material remains desirable.

The possibility that this group may have to be considered a separate species is discussed above.

***Chlamydera nuchalis* Jardine and Selby**

GREAT BOWERBIRD

The study of this species is made difficult by nomenclatural confusion and the great variability of plumages, which has never been adequately described.

The type of the species was sent by Macleay, and it seems impossible to determine whence it came. The same is true for other Macleay material, as for instance *Halcyon macleayi*. Northern Queensland was as difficult of access in the late 1820's as the coasts of northwest Australia and of Northern Territory, and both areas are equally qualified to claim the type locality of *nuchalis*. Gould had specimens from both areas, and when he found that they were different he restricted the type locality of the nominate race to Western Australia and described the Queensland race as *orientalis*. This action may have been based on information no longer available to us. In 1912 this fixation of the type locality was set aside by Mathews (*Novitates Zool.*, vol. 18, p. 440) with the implication that the picture of *nuchalis* in Jardine and Selby agreed with the Queensland subspecies but not with the western one. Actually, the eastern and western races are so similar that it would be difficult to identify a plate subspecifically. However, what indications are given by text and plate point to the western bird, Mathews' claims notwithstanding. The size is stated to be almost 15 inches, which is true for western birds, while eastern birds are usually less than 14 inches. The upper parts of the bird shown on the plate are rather homogeneous, while they are rather variegated and contrasting in Queensland birds. The throat is indicated as dark which again agrees better with western than with eastern birds. It is axiomatic in zoological nomenclature, and specifically stated in several opinions, that a name is not to be discarded or the action of a first reviser negated, without unequivocal proof. This was not supplied by Mathews, and Gould's restriction of type locality of *nuchalis* to Western Australia will stand.

The following course will produce the least disturbance to the currently accepted nomenclature. We restrict the type locality of *nuchalis* to the Port Darwin district of Northern Territory, and reinstate Gould's well-known name *orientalis* for the birds of the Port Denison population in Queensland.

Geographic variation within this species is essentially clinal

except for a "step" between an eastern and a western group, at the head of the Gulf of Carpentaria.

GEOGRAPHIC VARIATION

As Gould was the first to point out, Queensland birds differ from western birds in having the color of the upper parts more contrasting, more variegated black and white. Western birds are paler above and of a more uniform and more grayish color; the under parts, however, are often darker. Worn western birds cannot always be distinguished from worn Queensland birds. Queensland females are barred underneath, while western females are usually unicolorous like the males. A single adult male from the head of the Gulf of Carpentaria (Karumba, Norman River) has the color of *orientalis* (wing, 176, index, 75.5). An adult male (without crest) from the Gregory River, Queensland, only a little farther west, agrees with *nuchalis* in the coloration of the upper parts, but has an indication of barring on lower flanks and thighs (? not fully adult). It is large (wing, 181, index, 81). The line between the eastern and western subspecies should then presumably be drawn between Flinders and Leichhardt rivers.

WESTERN GROUP

When Mathews described *melvillensis* (1912, Austral Avian Rec., vol. 1, p. 52) he stated that it differed from *oweni* (West Kimberley) in its smaller size and darker coloration above. Both characters are correct. However, there is little difference between specimens from Melville Island and those from the mainland of Northern Territory, except that the latter average slightly larger. With the type locality of *nuchalis* restricted to Port Darwin, *melvillensis* is returned to synonymy. Birds from East Kimberley (Wyndham, Parry's Creek) are precisely intermediate in size and color between birds from Northern Territory and those from West Kimberley.

Actually there is a perfect cline in size of the populations of the following districts: Groote Eylandt (smallest)—Melville Island—Northern Territory—East Kimberley—West Kimberley. The intermediate birds from East Kimberley are perhaps best included with *oweni*. The wing in adults measures:

nuchalis

Groote Eylandt, male, 171.5, 173

Melville Island, male, 172–181 (175.0); female, 161–170 (165.5)

Northern Territory, male, 175–185 (178.7); female, 169–172 (170.8)

oweni

East Kimberley, male, 186, 187, 187; female, 175.5

West Kimberley, male, 190–198 (192.8); female, 183–188 (185.5)

PLUMAGES: The juvenile has the head uniform fuscous (without streaking), but there is a broad white bar across each feather of back and scapulars. Lower throat, breast, and flanks are white, with fuscous gray bars.

Immatures combine the juvenile wing and tail (longer, more pointed) with a body plumage that differs from that of the adult female only in being more distinctly barred underneath.

Adult females show little or no barring underneath and differ from adult males only in smaller size and usually in the absence of a nuchal crest. However, among 16 specimens that agree with other adult females in size, shape of the tail feathers, and general coloration, there are four birds with some rose-lilac feathers in the nape. All four birds not only have female characters, but were sexed as females on the labels. This nuchal crest is not so extensive as in males and lacks the fringe of feathers with silvery white tips. Still, it is definitely an approach to the condition in *Chlamydera maculata* where the sexes are identical.

Immature males are somewhat intermediate between immature and adult females, being either virtually unbarred underneath or with distinct barring.

Among our adult male specimens are six birds in otherwise perfectly adult plumage (length and shape of tail) which either lack the nuchal crest completely (four) or have merely a few rose-lilac feathers (two).

EASTERN GROUP

As stated above, the populations of Queensland from the Norman River eastward are characterized by the more variegated pattern of the upper parts and by the more evident barring of the under parts in the female and immature plumages. Gould's type locality of *orientalis* (Port Denison) is near the southern edge of the range of the species. We have examined additional specimens from Inkerman, Ingham, Bowen, Charters Towers, and "Brisbane" (undoubtedly an incorrect locality).

The populations at the northern extreme are different and are herewith described.

***Chlamydera nuchalis yorki*, new subspecies**

TYPE: A.M.N.H. No. 679231; adult female; Utingu, Cape York; June 22, 1912; Robin Kemp, collector.

Similar to *orientalis* Gould but smaller and in all plumages lighter, particularly on the under parts.

RANGE: Cape York and adjacent portions of northern Queensland, Australia.

The population that occurs at Cairns and Cooktown agrees with *yorki* in small size and with *orientalis* in the dark coloration. It is thus clearly intermediate. More material must be examined before this population can be definitely assigned subspecifically.

In view of the geographical variation of size, the following tabulation of measurements will be of interest.

Wing, adult and subadult males, Cape York, 164, 168, 172, 172, 172; Cairns, 168, 169, 172; Port Denison district, 172, 173, 175, 175.5, 176, 176.5, 177, 184; immature males, Cape York, 163; Cairns, 173; adult females, Cape York, 154.4, 160, 162, 162, 167; Cairns, 160, 165, 165; immature females, Cape York, 156, 157.5, 161, 162; Cairns, 156, 162.5; Port Denison, 168.

The tail-wing ratio is the same in all three populations, 74-78 in adult males and 75-79 in adult females.

PLUMAGES: Insufficient material and evidently incorrect sexing of many specimens have made it difficult to determine the sequence of plumages. The statements may have to be revised in the light of additional material.

ADULT MALES: In typical *orientalis* (Port Denison, Inkerman, etc.) there always seems to be a fully developed nuchal crest. There is an indication of faint barring of the under parts in two of five otherwise adult birds (Cooktown). Of two birds with adult wings and tail, one has a nuchal crest and is unbarred underneath; the other lacks the crest and is faintly barred (Cape York). Of four birds with adult wing and tail, one has a fully developed nuchal crest, one a few rose feathers on the neck, while two have no crest at all. There is no barring on any of the four birds.

SUBADULT MALES: Three specimens from Port Denison, Inkerman, and Ingham have the measurements (wing, 172, 176, 176.5), tail shape, and tail proportions (76.4, 77.9, 79.0) of adult birds. All three, however, are distinctly barred underneath, particularly on the flanks. One of these birds has no crest at all;

the others have a few rose-colored feathers. These may be adult birds in a retarded plumage.

IMMATURE MALES: With the tail narrow, pointed, and long (index, 79.7, 80.8, 82.1). Upper abdomen and flanks barred. No trace of a crest.

ADULT FEMALES: In coloration quite indistinguishable from immature males, but smaller and with the broad rounded tail feathers of adult birds. Tail short (index, 75.3–78.7, once 81.5). No crest.

IMMATURE FEMALES: Similar to adult females but averaging more heavily barred underneath. Tail narrower, more pointed and longer (index, 78.2–84.0, average 81.0).

JUVENILE: Two birds from the Bowen district have mantle and back brown, spotted with white; the crown dark brown, with narrow white shaft streaks; sides of head, upper and lower throat narrowly barred brownish and white; and breast and flanks broadly barred, abdomen white. Both specimens are exceedingly worn. One of the birds has a faint rose-lilac tint to the shaft streaks of some of the feathers of the nape. They differ from juveniles of *nuchalis* in the strong streaking on the head.

***Chlamydera cerviniventris* Gould**

FAWN-BREASTED BOWERBIRD

There is no difference in coloration between birds of Cape York and those from New Guinea, and the difference in size is too slight for nomenclatural recognition. Wing, adult males, Cape York, 139–150 (145.4); southeast New Guinea, 143–151 (147.8), north New Guinea, 145–152 (149.0).

SPECIATION IN AUSTRALIAN BOWERBIRDS

There is much to suggest that the forested areas of the Papuan region are the ancestral home of the bowerbird family. In Australia also the majority of species is restricted to the forested zone in the east. Indeed, members of the genus *Chlamydera* are the only ones to venture into the open country.

As in other groups of birds in which the males have special displays, there seems to be a rapid differentiation of genera. Of the 10 genera now recognized in the family, no fewer than seven are monotypic (*Cnemophilus*, *Archboldia*, *Scenopoeetes*, *Prionodura*, *Xanthomelus*, *Sericulus*, and *Ptilonorhynchus*). *Chla-*

mydera and *Amblyornis*, with four species each, are the most polytypic genera of the family; *Ailuroedus*, with two species, is intermediate.

However, active speciation is still going on in this family. It is interesting to see that all stages of speciation are represented among the Australian genera of the family.

Two species, *Prionodura newtoniana* and *Scenopoeetes dentirostris*, have a very limited range and show no variation within it. In four species there is geographic variation of a clinal nature: *Sericulus chrysocephalus*, *Chlamydera maculata* (*maculata* group), *Chlamydera cerviniventris*, and *Chlamydera nuchalis*. In *C. nuchalis* there is a marked step in the cline in west Queensland, suggesting secondary intergradation between previously separated populations. Finally, there are three species that are composed of widely separated groups of populations, which qualify as incipient species. In the case of *Ptilonorhynchus violaceus* there is not yet much morphological difference between the nominate subspecies *violaceus* in the south and the small-sized North Queensland subspecies *minor*. In *Ailuroedus crassirostris*, however, the New South Wales-southern Queensland *crassirostris* is so different from the northern Queensland *maculosus* that many authors consider these two forms separate species. Their ranges are separated by a gap of about 600 miles (1000 kilometers). Even more different are *Chlamydera maculata* (eastern Australia) and *guttata* (Western Australia), the ranges of which are separated by a gap of about 400 to 500 miles.

We find thus in the Australian bowerbirds all stages of speciation from the homogeneous monotypic species through the clinal species to widely separated isolates of the nature of incipient species. A comparison of the life history of *Ailuroedus c. crassirostris* with that of *A. c. maculosus* and of the life history of *Chlamydera m. maculata* with that of *C. m. guttata* would be particularly rewarding in that it might determine to what extent differences in habits and ecology support the status of these populations as incipient species.

SUMMARY

Eight species of bowerbirds are known in Australia. *Scenopoeetes dentirostris*, *Prionodura newtoniana*, and *Chlamydera cerviniventris* have no recognizable subspecies. In the other five

species, the following subspecies can be recognized in addition to the nominate race:

Ptilonorhynchus violaceus minor, Cairns district, Queensland

Sericulus chrysocephalus rothschildi, Blackall and Bunya Mountains, southern Queensland

Ailuroedus crassirostris maculosus, Cairns district, Queensland

Chlamydera nuchalis oweni, West Kimberley

Chlamydera nuchalis yorki, new subspecies, Cape York, northern Queensland

Chlamydera nuchalis orientalis, central Queensland

Chlamydera maculata guttata, Western Australia

Further work may show that *guttata* has reached species level.

Most of the species have a juvenile plumage which by an incomplete molt is changed into an immature plumage, which is usually similar to the plumage of the adult female.

The genus *Xanthomelus* Bonaparte, 1854, seems to have no characters by which it can be separated from *Sericulus* Swainson, 1825. It is proposed that the two genera be combined.

Sericulus chrysocephalus differs from all other known birds in having a shorter wing and tail in the adult male plumage than in the immature and female plumages. A relatively shorter tail in adults (as compared with immatures) occurs in several species of bowerbirds.

Isolates within three of the eight species are so distinct and so completely isolated that they must be considered incipient species.

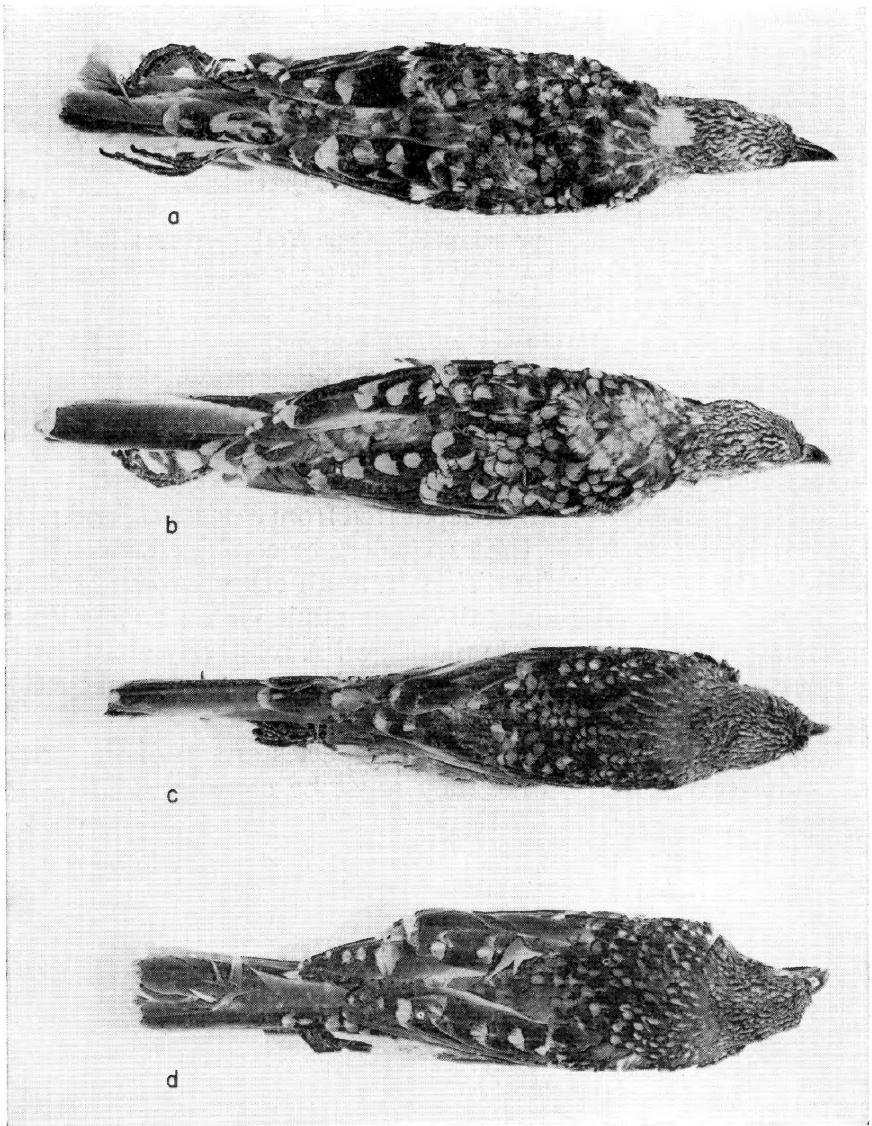


FIG. 1. A. Type of *Chlamydera maculata sedani* Mathews (A.M.N.H. No. 679144). The difference between the darker smooth spots on the new feathers and the paler, streaky spots on the worn feathers of the back is quite conspicuous. B. Juvenile (A.M.N.H. No. 679143), Sedan, Cloncurry River. Note the large oval spots on the back. C. Female (Chicago Natural History Museum No. 154185), Pentland, Queensland. D. Female (Chicago Natural History Museum No. 186479), Blackwater, 160 miles west of Rockhampton, Queensland. The bird from Pentland is as dark and its spots are as small as in the bird from Rockhampton.